

WHAT IS CLAIMED IS

1. A semiconductor device comprising:

a pair of impurity diffused regions formed in a silicon substrate, spaced from each other; and

a gate electrode formed above the silicon substrate between the pair of impurity diffused regions intervening a gate insulation film therebetween, the gate electrode being formed of a first polycrystalline silicon film formed on the gate insulation film, a second polycrystalline silicon film formed on the first polycrystalline silicon film and having crystal grain boundaries which are discontinuous to the first polycrystalline silicon film, and a metal nitride film formed on the second polycrystalline silicon film.

2. A semiconductor device comprising:

a pair of impurity diffused regions formed in a silicon substrate, spaced from each other; and

a gate electrode formed above the silicon substrate between the pair of impurity diffused regions intervening a gate insulation film therebetween, the gate electrode being formed of a first polycrystalline silicon film formed on the gate insulation film, a second polycrystalline silicon film formed on the first polycrystalline silicon film and having crystal grain boundaries which are discontinuous to the first polycrystalline silicon film, a metal nitride film formed on the second polycrystalline

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S15
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silicon film, and a metal film form on the metal nitride film.

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S15
C10*

3. A semiconductor device according to claim 1,
wherein

a native oxide film is formed between the first polycrystalline silicon film and the second polycrystalline silicon film.

4. A semiconductor device according to claim 2,
wherein

a native oxide film is formed between the first polycrystalline silicon film and the second polycrystalline silicon film.

5. A semiconductor device according to claim 1,
wherein

the first polycrystalline silicon film is doped with boron.

6. A semiconductor device according to claim 2,
wherein

the first polycrystalline silicon film is doped with boron.

7. A semiconductor device according to claim 1,
wherein

the first polycrystalline silicon film and the second polycrystalline silicon film are doped with boron, a boron concentration in the first polycrystalline silicon film near an interface between the first polycrystalline silicon

film and the second polycrystalline silicon film is higher than a boron concentration in the second polycrystalline silicon film near the interface between the first polycrystalline silicon film and the second polycrystalline silicon film.

8. A semiconductor device according to claim 2, wherein

the first polycrystalline silicon film and the second polycrystalline silicon film are doped with boron, a boron concentration in the first polycrystalline silicon film near an interface between the first polycrystalline silicon film and the second polycrystalline silicon film is higher than a boron concentration in the second polycrystalline silicon film near the interface between the first polycrystalline silicon film and the second polycrystalline silicon film.

9. A semiconductor device according to claim 1, wherein

a crystal grain size of the first polycrystalline silicon film is smaller than a crystal grain size of the second polycrystalline silicon film.

10. A semiconductor device according to claim 2, wherein

a crystal grain size of the first polycrystalline silicon film is smaller than a crystal grain size of the second polycrystalline silicon film.

11. A method for fabricating a semiconductor device comprising the steps of:

forming a gate insulation film on a silicon substrate;

forming a first silicon film doped with boron on the gate insulation film;

forming a second silicon film on the first silicon film;

forming a metal nitride film on the second silicon film;

forming a metal film on the metal nitride film; and

patterning a layered structure of the first silicon film, the second silicon film, the metal nitride film and the metal film to form a gate electrode of the layered structure.

12. A method for fabricating a semiconductor device according to claim 11, wherein

the step of forming the first silicon film includes the step of forming a polycrystalline silicon film on the gate insulation film and the step of doping boron in the polycrystalline silicon film.

13. A method for fabricating a semiconductor device according to claim 12, further comprising between the step of forming the polycrystalline silicon film and the step of doping boron,

the step of amorphizing the surface of the polycrystalline silicon film.

14. A method for fabricating a semiconductor device according to claim 11, wherein

the step of forming the first silicon film includes the step of forming an amorphous silicon film on the gate insulation film and the step of doping boron in the amorphous silicon film.

15. A method for fabricating a semiconductor device according to claim 11, wherein

in the step of forming the second silicon film, the second silicon film is formed on the first silicon film intervening a native oxide film therebetween.

16. A method for fabricating a semiconductor device according to claim 11, further comprising between the step of forming the first silicon film and the step of forming the second silicon film,

the step of thermal processing to activate the boron doped in the first silicon film.

17. A method for fabricating a semiconductor device according to claim 11, wherein

in the step of forming the second silicon film, the second silicon film is formed in a 2 - 20 nm-thick.

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